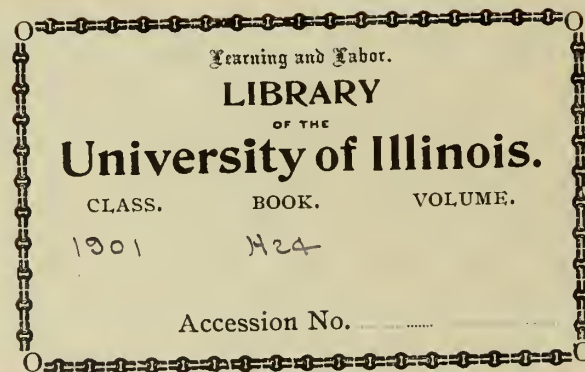


HARRISON

Oil on Railroads
and Wagon Roads

Civil Engineering
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Oil on Railroads and Wagon Roads

by

Dale Stuart Harrison

Thesis for
Degree of Bachelor of Science
in
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Ira C. Baker

HEAD OF DEPARTMENT OF Civil Engineering.


Oil on Railroads and Wagon Roads.

The use of crude oil on railways and highways is attracting the attention of the engineering profession all over the country. Oil was used primarily as a preventative of the destroying and disagreeable dust so frequently encountered on both wagon and railroads. Its field, however, is by no means limited to that alone, as many advantages of its use have been discovered.

Railroads.

This invention is of considerable interest to the railroads, as the alleviation of the discomforts of travel is constantly receiving the attention of railroad officials.

The West Jersey and Seashore Division of the Pennsylvania Railroad



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was the first to introduce this use of oil, the first experiments being made in April, 1897. Patents have been issued to Mr. J. H. Nichol, Assistant Engineer of the Company, who originated the idea. The patent was issued for an Improvement in Railway Roadbeds, the ordinary roadbed, if dusty, being considered unfinished. "Competent counsel has advised that the patent covers the use of any liquid, except water, for the purpose."*

Some of the roads which have taken kindly to the innovation in the East are the Boston and Maine, Boston and Albany, and New York Central and Hudson River; and in the West, the Wisconsin Central, Burlington and Missouri, Chicago and Alton, and others.

The oil is a product of petroleum distillation and is

* Extract from circular issued by the West Jersey and Seashore Railroad.

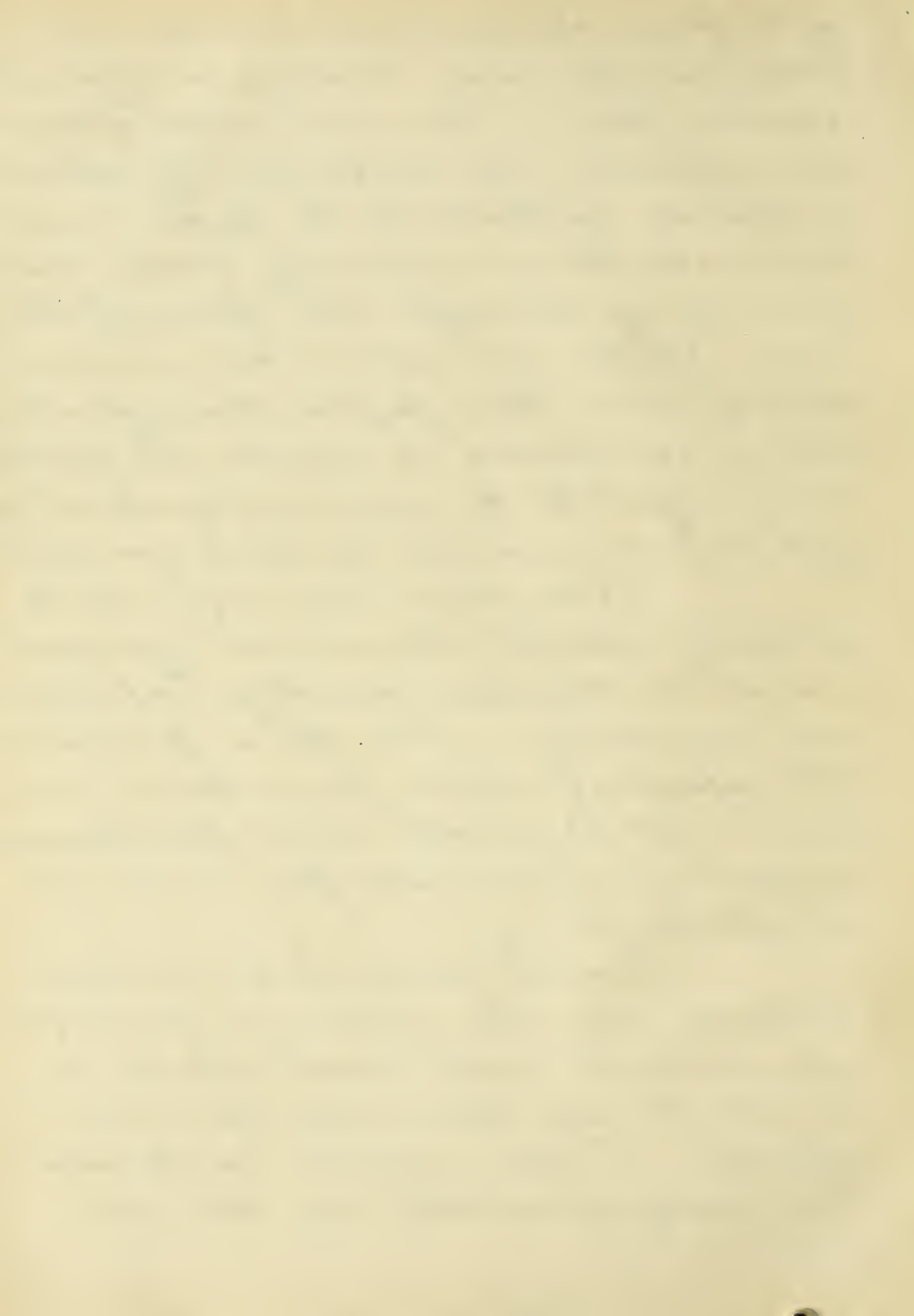
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heavy, non-combustible, and penetrating, possessing a slightly disagreeable odor which disappears in a few days. The oil is generally applied by means of a system of pipes arranged on an ordinary flat car, the pipes receiving the supply through a hose which is connected directly to the commercial tank-car holding from six to eight thousand gallons. A four-inch pipe runs the length of the "oil-car", and is so arranged that the hose from the tank-car may be connected at either end. Near the center of the "oil-car", a branch pipe carries the oil to three sections of two-inch pipe, - one suspended transversely below the car extending to the ends of the cross ties, and one six foot section at either side of the car. Each of these latter sections is connected with the supply pipe by a rubber hose, which allows them to swing out as far as desired and also permits them to be raised or lowered to conform to the surface encountered, as well

as to pass obstructions, such as cattle guards cars standing on adjacent tracks, etc. The movement of these side sections is controlled by means of chains fastened to the pipes and connected to an ordinary brake-rod passing up through the floor of the car. Slits are cut in the under side of these three pipes, through which the oil is allowed to escape, the quantity being regulated by means of quick-acting gate valves, worked by levers from above.

Three men are required to properly operate the car in yards, while in the open country but two are necessary. The train proceeds at a speed of about four miles an hour. At this rate about two thousand gallons of oil are used per mile of single track.

Gravel, sand, and cinder ballasts are the ones in general use which most need such a treatment as this use of oil affords. These ballast materials are easily penetrated by the oil,



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which fastens together the fine particles and also forms a material not easily permeated by water.

Some of the advantages resulting from this use of oil are as follows:

1. The lifting of dust by passing trains is prevented. Thus, greater comfort to passengers is insured, and injury to furnishings of coaches and contents of freight cars is lessened. Wear on machinery is reduced, and the number of hot boxes is materially decreased.

2. The cost of track maintenance is reduced, for several reasons.

The oil almost immediately kills vegetation between and immediately alongside of the tracks, thereby eliminating a constant source of trouble to trackmen. Rain water falling on oiled roadbed does not easily penetrate it, but runs off into the side ditches. Hence in a degree washing is prevented and

less labor is required to maintain the surface of rails. Since less moisture remains in the ballast, alternate freezing and thawing produces less effect; and the rails escape surface bending from that cause. Greater safety results from the lessened probability of the tracks being "heaved", and of washouts occurring.

It has been noted that snow is less liable to lodge on treated roadbed, hence there is less danger of yards becoming icy and dangerous.

3. The life of the cross ties is materially lengthened. The oil not only prevents moisture from gathering around the tip and soaking in, but the oil penetrates the wood, thus preventing the absorption of water that might otherwise occur. After being applied three or four months the oil enters the tie a distance of from a quarter to half an inch, depending upon



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the closeness of grain. It is claimed that the life of the tie is increased from one to two years, which is a large item. Further, it has been found that the oil prevents the tie from becoming ignited from the hot coals dropped by the engine.

The West Jersey and Seashore found the cost of treating a mile of gravel ballast on single track to be about \$45 for one application, the oil costing 2 cents per gallon.

The President of the Boston and Maine in an annual report stated that they expended about \$200 per mile of double track, in their treatment, but as the price paid for the oil, the amount used, or the character of the ballast was not stated, no comparison is afforded. Probably a mean of these figures or from \$65 to \$75, would be a fair estimate of cost for oiling one mile of single track under ordinary conditions.

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The first application lasts a year. A lesser amount than stated applied for the two succeeding years is all that is required, the ballast by that time becoming thoroughly impregnated. The oil should be used immediately after extensive tie renewals, so that the ballast will be disturbed as little as possible afterward.

The increasing use of oil by the most important railroads seems to prove that the advantages claimed by the promoters are being substantiated. Many advertisements are now seen of "improved and dustless roadbeds".

Wagon Roads.

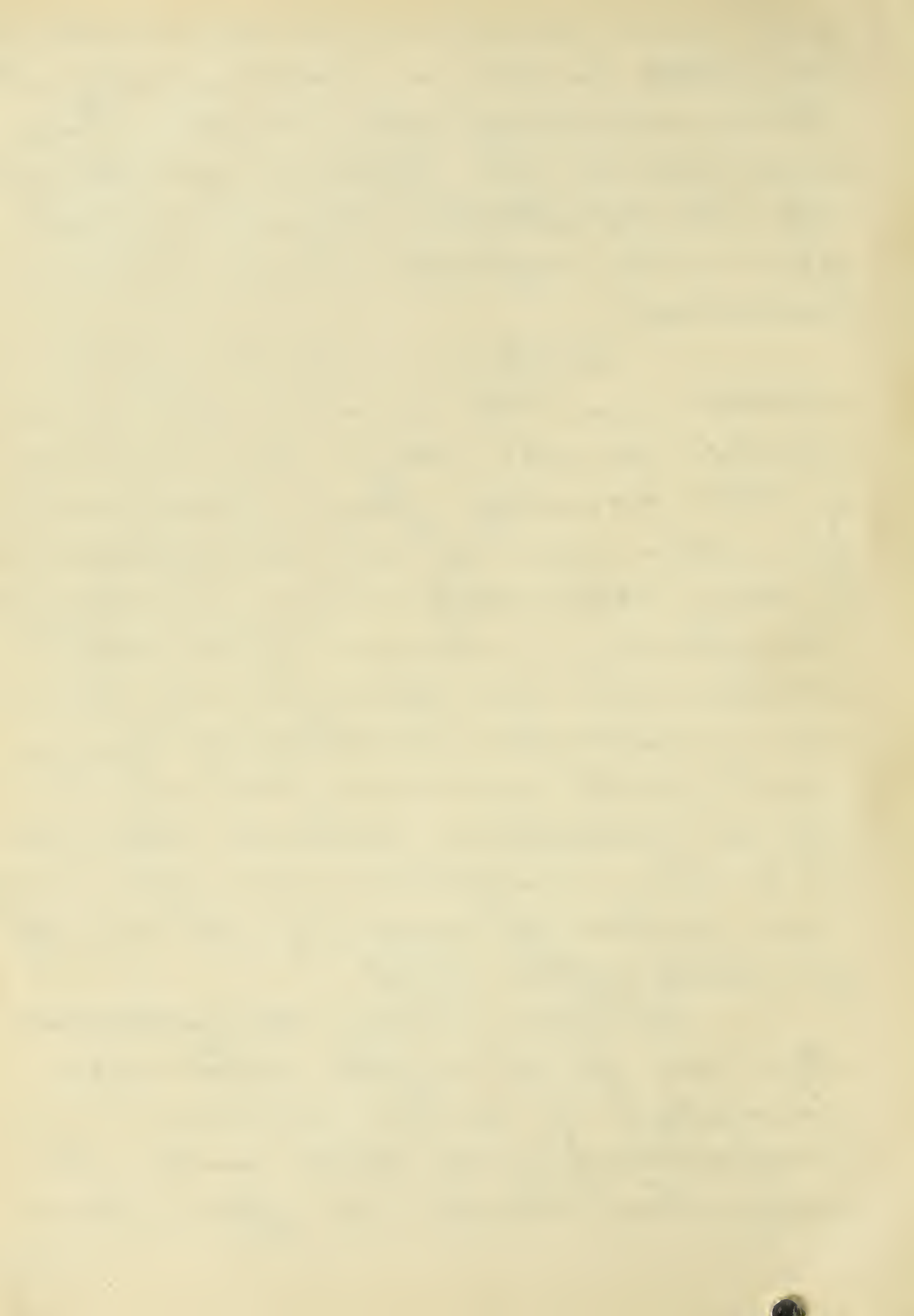
From the point of view of the highway commissioner and the municipality, the use of oil on wagon roads possesses many advantages. Its use has by no means become general; and aside from occasional items in papers,

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and mere mention in conversations, but little is seen or heard concerning it. However, many experiments have been made in different parts of the United States, from which favorable reports have been received.

California leads all states in the number of miles treated, as the long dry seasons of that country form ideal conditions for this use of oil, which furthermore is there obtainable at an exceedingly low price. Some of the other states, as New Jersey and Iowa, have used this method of laying dust with more or less success. It is interesting to know that the U. S. Government is now experimenting on a section of road in the vicinity of Washington D. C.

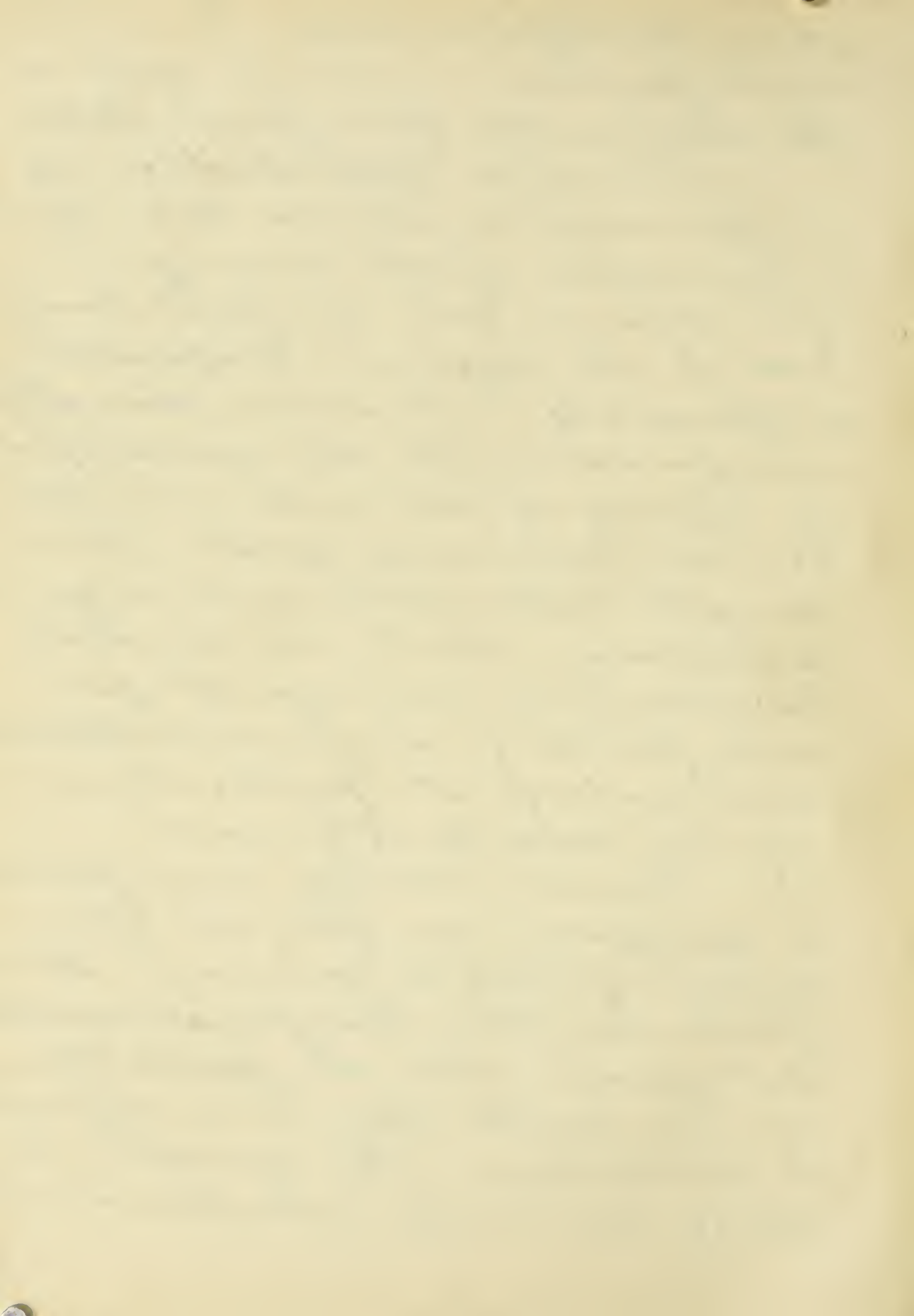
It has been thought that this use of oil might resist the formation of mud; and on comparatively good hard roads, it may have such an effect, but



it is doubtful whether its use could produce much benefit on the mud roads of our prairie states.

The oil is applied either by a specially constructed tank-wagon or by means of the ordinary sprinkling cart, it first being heated to as high a temperature as possible. It is then thoroughly incorporated with the road surface, the affinity of the earth and the hot oil being very great. It is thought that under ordinary conditions about one hundred barrels of oil are required per mile for the first general treatment, while subsequent applications require considerably less.

The oil certainly accomplishes its purpose, as far as the laying of dust is concerned. It also produces other beneficial results, but just what the possibilities are in such use it is difficult to determine. The question is being more and more discussed,



Dustless Roadbed Companies are¹¹
being formed and as there is a
general trend towards better roads,
it seems probable that the scope
of the work will be widely extended.





